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AUTHOR Mancuso, Louis C.
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ABSTRACT

The purpose of this study was to develop a broadcast economic computer simulation and to ascertain how a lecture-computer simulation game compared as a teaching method with a more traditional lecture and case study instructional methods. In each of three sections of a broadcast economics course, a different teaching methodology was employed: (1) the lecture method; (2) the case study method; and (3) the lecture-computer simulation method. Approximately 25 students were enrolled in each section. One conclusion was that the differences among the teaching methodologies were not significant with respect to grades earned by the students in the three groups. It was not possible in this study to determine whether learning retention is similar over an extended period of time for students in the different groups. A second conclusion was that the learning retention of students may be significantly higher in the lecture-computer simulation section than in the lecture or case study sections only if the simulation is correlated directly to the lecture with respect to the main decision areas. (LL)

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THE USE OF COMPUTER SIMULATION GAMING IN TEACHING BROADCAST ECONOMICS[1]

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by

Louis C. Mancuso
Xavier University
3020 Paris Avenue
New Orleans, La. 70119

Ideally, university students enrolled in curricula for professional careers need instruction that offers knowledge and practical experience for future employment. In commercial broadcast education all instruction should be complemented by practical applications that reinforce classroom activities. This is not always possible in the university environment for all areas of broadcasting. Broadcast economics, for example, requires a commercial orientation if the subject prepares the student for a career in the broadcasting industry. Since university FM stations are non-commercial designates, commercial applications are not possible. Although carrier-current AM operations offer opportunities for commercialization, these are not comparable to "real-life" radio markets due to their non-competitive nature. The field of broadcast economics, then, poses a difficult methodological problem in classroom teaching.

Typically, two methods of instruction, lecture and case study, have been used predominantly among broadcast educators

CS 501 055

in teaching broadcast economics. The traditional lecture method often involves little more than one-communication, i.e., there may be a question-answer period but the main emphasis is upon a teacher who stands in front of the class and lectures. The case study method attempts to provide an environment which may reinforce principles of broadcast economics. This is accomplished by allowing the student in the classroom to solve hypothetical broadcast economic problems. But these may not be totally authentic because of the instructor's lack of skill in selecting suitable cases or the case discussion can become superficial to the participants.[2] In recent years, however, the computer has been used to simulate real-life situations in business and economics. These computer simulations offer numerous extensions of practical applications and experience for students. Moreover, lecture-computer simulation has evolved into a method of teaching economics and business principles.[3]

The review of the literature revealed that simulation has been used as a teaching methodology in at least three areas: military, business, and education. Due to its ease of adaptability to many fields of study and its inexpensiveness, the military's utilization of simulation has increased in importance in recent years.[4] Moreover, the simulation teaching methodology is being incorporated into business curricula to help expand students' knowledge of business principles and practices.[5] Educational simulation studies have explored the concept of simulation being used to teach principles and practices.[6]

A review of the literature provided very little knowledge of the effects of different teaching methodologies. In the realm of broadcast economics there exist no computer simulation games and research on this matter. The lack of both a computer simulation and simulation research in the area of broadcast economics led to this study.

Statement of the Problem

The purpose of this study was to develop a broadcast economic computer simulation and to ascertain how a lecture-computer simulation game, as a teaching method, compared with the more traditional lecture and case study instructional methods. The basic hypothesis for this study was: Students in the lecture-computer simulation group will score significantly higher grades than students in either the lecture group or the case study group. The basic hypothesis was segmented into eight subsidiary hypotheses incorporated into these two statements:

> Students taking the management test, the programming test, the research test, the mid-term examination, the sales test, the regulation test, and the final examination in the lecture-computer simulation group will score significantly higher grades than students in either the lecture group or the case study group.
>
> The average grade in the lecture-computer simulation group will be significantly higher than the average grades of students in either the lecture group or the case study group.

BROADEC: A Computer Simulation in Broadcast Economics

BROADEC is a computer simulation game designed to be played in the field of broadcast economics in which the

par icipants must make managerial decisions based upon the parameters of the game. The decisions included selecting programming, commercial rates, number of salesmen, and research data. The participants of the game were divided into three groups designated as organizations. These three organizations comprised one broadcast operation. The geographical market used to play BROADEC is an area encompassing fourteen counties which encircle a large metropolitan area of 720,000 households inclusive with 700,000 households having television sets. The organizations for this game are considered local network-affiliated television stations which begin the computer simulation game with an initial capitalization of $200,000 from a sale of stocks.

Methodology

The basic research design of this study was experimental. One variable, the teaching methodology, was manipulated. The manipulation occurred by using three sections of a three-semester-hour course in broadcast economics. Twenty to twenty-five students were enrolled in each section. This course was taught at the University of Southern Mississippi during the 1973-74 academic year. Students were divided into three treatment groups: (1) the lecture section; (2) the case study section; and (3) the lecture-computer simulation section. The participants in each section were exposed to the following areas contained in broadcast economics: accounting, advertising agencies, audience research, broadcast engineering, economic indexes, management, network affiliation, personnel, programming, broadcast regulation, research, and sales. The

subject matter was the same in each section but the teaching methodology was different.

The students in each section were given seven identical, objective, multiple-choice examinations: the management test; the programming test; the research test; the mid-term test; the sales test; the regulation test; and the final examination.[7] Each test consisted of fifty questions, each valued at two points. All examinations were hand tabulated by three coders.

The effects of the teaching methodologies employed in the lecture, case study, and lecture-computer simulation sections were measured by the analysis of variance statistical method.[8] If a significant difference occurred at the .05 level, the Scheffe Test was applied to ascertain which section or sections caused the difference.[9] The .05 level was again used for the Scheffe Test.

Results and Discussion

The results of the study indicate that five of the eight subsidiary hypotheses were rejected at the .05 significance level (see Table 1). The Scheffe Test's comparison of the lecture section, the case study section, and the lecture-computer simulation section for the programming test, the sales test, and the average grade hypothesis are located in Tables 2, 3, and 4 respectively. A review of the mean scores reveals that the lecture-computer simulation section generally had higher means than either the lecture section or the case study section (see Table 5). However, as shown in Table 5, the

TABLE 1

THE ANALYSIS OF VARIANCE STATISTICAL COMPARISONS OF THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION FOR EACH TEST

Test	P
Management	.1204
Programming	.0038
Research	.5177
Mid-Term	.2424
Sales	.0071
Regulation	.1109
Final	.9170
Average Grade	.0364

TABLE 2

THE SCHEFFE TEST'S COMPARISON OF THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION FOR THE PROGRAMMING TEST

Comparisons	Scheffe Values	Level of Significance[a]
The Lecture Section versus the Case Study Section	.8411	NS[b]
The Lecture Section versus the Lecture-Computer Simulation Section	6.5732	.05[c]
The Case Study Section versus the Lecture-Computer Simulation Section	11.1177	.05[d]

[a] F Value = 6.28--Significant at the .05 level.

[b] NS means that the differences were not significant at the .05 level.

[c] The lecture-computer simulation section is causing the significant difference because its mean value is 56.4800 as compared to the lecture section's mean value of 49.6800.

[d] The lecture-computer simulation section is causing the significant difference because its mean value is 56.4800 as compared to the case study section's mean value of 47.1000.

TABLE 3

THE SCHEFFE TEST'S COMPARISON OF THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION FOR THE SALES TEST

Comparisons	Scheffe Values	Level of Significance[a]
The Lecture Section versus the Case Study Section	.4064	NS[b]
The Lecture Section versus the Lecture-Computer Simulation Section	6.4075	.05[c]
The Case Study Section versus the Lecture-Computer Simulation Section	9.1448	.05[d]

[a]F Value = 6.28--Significant at the .05 level.

[b]NS means that the differences were not significant at the .05 level.

[c]The lecture-computer simulation section is causing the significant difference because its mean value is 50.8000 as compared to the lecture section's mean value of 44.9600.

[d]The lecture-computer simulation section is causing the significant difference because its mean value is 50.8000 as compared to the case study section's mean value of 43.4000.

TABLE 4

THE SCHEFFE TEST'S COMPARISON OF THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION FOR THE AVERAGE GRADE HYPOTHESIS

Comparisons	Scheffe Values	Level of Significance[a]
The Lecture Section versus the Case Study Section	1.9125	NS[b]
The Lecture Section versus the Lecture-Computer Simulation Section	1.7379	NS[b]
The Case Study Section versus the Lecture-Computer Simulation Section	6.8952	.05[c]

[a]F Value - 6.28--Significant at the .05 level.

[b]NS means that the differences were not significant at the .05 level.

[c]The lecture-computer simulation section is causing the significant difference because its mean value is 55.0391 as compared to the case study section's mean value of 50.6709.

TABLE 5

THE MEANS AND THE STANDARD DEVIATIONS FOR EACH TEST IN THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION

Tests	Lecture Section		Case Study Section		Lecture-Computer Simulation Section	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Management	61.9200	10.8441	55.9000	10.6109	58.2400	7.1627
Programming	49.6800	10.7730	47.1000	6.4024	56.4800	9.3172
Research	52.4000	12.2115	50.9000	7.9618	54.1600	6.1689
Mid-Term	50.3800	7.6751	48.5000	5.7922	52.4800	8.8414
Sales	44.9600	10.2469	43.1000	6.2001	50.8000	6.5239
Regulation	46.1600	8.3699	42.8000	6.7942	47.6800	7.3687
Final Examination	64.8000	14.4334	66.1000	7.1967	65.4400	6.6097
Average Grade	52.9715	7.2515	50.6709	3.4494	55.0391	4.5105

lecture-computer simulation means for the management test and the final examination were lower.

A study of the standard deviations of the three sections reveals that the lecture section had the highest deviation for seven of the eight tests (see Table 5). Table 5 also shows that the case study section's grades deviated the least.

Table 6 presents the median score of each test for the lecture section, the case study section, and the lecture-computer simulation section. A survey of the medians reveals that the lecture-computer simulation section generally had the highest medians when compared to the other sections; whereas, the case study section had the lowest medians. A comparison of the medians to the means indicates that the results are fairly similar.

The majority of the students participating in the study were male, ages twenty to thirty. The subjects were predominantly white, single, and classified as undergraduates. The grade point average of the seventy students was 2.75 on a 4.0 scale. These data, sex, age, race, marital status, student classification, and grade point average, were obtained at the initial class meeting by asking each student to complete a questionnaire.

The overall mean results indicate that the lecture-computer simulation section generally had higher means than the other two sections but not at the .05 significance level. A review of the means revealed that the scores recorded were not very high. This was expected since the tests were

TABLE 6

THE MEDIANS FOR EACH TEST IN THE LECTURE SECTION, THE CASE STUDY SECTION, AND THE LECTURE-COMPUTER SIMULATION SECTION

Test	Lecture Section	Case Study Section	Lecture-Computer Simulation Section
Management	60	58	58
Programming	50	46	58
Research	50	48	54
Mid-Term	52	48	54
Sales	42	42	52
Regulation	46	42	48
Final Examination	68	66	64
Average Grade	54.57	49.85	55.14

made purposely difficult for students at this stage in their curriculum in order that the tests would measure, to the fullest extent practical, the knowledge acquired in this specific course rather than test their cumulative knowledge in the area.

Students in the lecture-computer simulation section appeared to show more interest than those in either the lecture section or the case study section. There was considerably greater incidence of informal, out-of-class interaction between the instructor and the organizations, or representatives of each organization, in the lecture-computer simulation section. One reason for this interaction was the participants' desire to express their interest in the game to the instructor and to obtain information. The members of the case study section showed less overt interest because only a few persons participated and few students read the cases. In an attempt to alleviate these two problems, the instructor initiated, during the second week of class, the practice of randomly selecting students to comment about a particular case. Class participation was thus stimulated.

The finding that the mean grades were higher in the lecture-computer simulation section as compared to the other two sections may be due to the combination of factors. The case study section by its very nature allows many theories to be introduced and the student must decide for himself which theory is applicable to the given situation. The students in

the lecture section did not receive any reinforcement, that is, they did not play BROADEC. This may help to explain the lower means of the lecture section as compared to the lecture-computer simulation section.

Analyzing the statistical results indicated that the two main decision areas of BROADEC, programming and sales, showed a statistical difference at the .05 level. The main decision areas are judgmental areas which affect the outcome of the game. Students playing BROADEC allocated the majority of their decision-making time to determining the programming-advertising cost mix. Cost mix is defined as the comparison of the ratings of the program selected in each time slot to the advertisement cost. Thus, everytime an organization made a decision the members were exposed to both programming and sales. When the participants were given the lectures on programming and sales, BROADEC acted as a reinforcing agent to the lectures, thus, significantly higher scores were attained in the lecture-computer simulation section.

The management, research, mid-term, regulation, and final examination areas showed no significance at the .05 level. It is believed that the hypotheses of the above mentioned areas were not supported since these areas are not main decision areas of BROADEC. Students did not make decisions in these areas but only experienced wild cards. A wild card is defined as an out-of-the-ordinary situation in which the instructor imposes a certain event on the entire broadcast operation or

on one organization. The wild cards, then, acted as reinforcing agents. With the help of the wild cards, the participants in the lecture-computer simulation section generally had higher means than the participants in the other two sections, but not at the .05 significance level.

Conclusions

The findings of this study indicate that the differences among the teaching methodologies are not very substantial with respect to grades earned by students in the three groups. This information leads one to conclude, based upon the limitations of the study, that in teaching broadcast economics, the students learn equally well when using either the lecture, the case study, or the lecture-computer simulation teaching methodologies. The foregoing conclusion would imply to the broadcast economics instructor that learning retention is generally similar for the three teaching methodologies explored. There is a need for future studies to ascertain if learning retention is similar over an extended period of time.

The second conclusion is based upon the existence of a demonstrated correlation between the main decision areas of BROADEC, programming and sales, and knowledge acquisition in broadcast economics. Since the main decision areas are judgmental areas which affect the outcome of the game, students playing BROADEC allocated the majority of their decision-making time to determining the programming-advertising cost mix. When the participants were given the lectures on programming and sales, BROADEC acted as a reinforcing agent to the lectures,

thus, significantly higher scores were attained in the lecture-computer simulation section. Moreover, BROADEC allowed for more immediate feedback, thus, closure was achieved swiftly and overtly. The programming and sales areas of BROADEC permit experiential learning which enables the student to be an active rather than a passive learner. The study reveals that if a simulation contains main decision areas, the participants in the lecture-computer simulation section will generally score significantly higher grades than the participants in either the lecture or case study sections. The second conclusion suggests that the learning retention of students may be significantly higher in the lecture-computer simulation section than in the lecture or the case study sections only if the simulation is correlated directly to the lecture with respect to the main decision areas. Certainly, replication and expansion of this study are desirable to ascertain if these conclusions have generality.

FOOTNOTES

[1]This study was undertaken as a dissertation submitted to the Graduate School of the University of Southern Mississippi in partial fulfillment of the requirements for the degree of Doctor of Philosophy under the co-direction of Dr. Birthney Ardoin, Chairman-Journalism and Dr. James L. Hall, Assistant Professor-Communication.

[2]Ann K. Stenzel and Helen M. Feeney, Learning by the Case Method: Practical Approaches for Community Leaders (New York: The Seabury Press, 1970), pp. 11-12.

[3]Examples of computer simulation are offered in Clark C. Abt, Serious Games (New York: The Viking Press, 1970). See also, Harold Guetzkow, ed., Simulation in Social Science: Readings (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962); Richard F. Barton, A Primer on Simulation and Gaming (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970); Joe H. Mize and J. Grady Cox, Essentials of Simulation (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1968); Charles P. Bonini, Simulation of Information and Decision Systems in the Firm (Chicago: Markham Publishing Company, 1967); Martin Shubik, ed., Game Theory and Related Approaches to Social Behavior (New York: John Wiley and Sons, Inc., 1964); and John R. Raser, Simulation and Society: An Exploration of Scientific Gaming (Boston: Allyn and Bacon, Inc., 1969).

[4]Jack A. Adams, "Some Considerations in the Design and Use of Dynamic Flight Simulators," in Simulation in Social Science Readings, ed. by Harold Guetzkow (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962), pp. 29-47.

[5]Paul S. Greenlaw, Lowell W. Herron, and Richard H. Rawdon, Business Simulation in Industrial and University Education (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962).

[6]James A. Robinson; Lee F. Anderson; Margaret G. Hermann; and Richard C. Snyder. "Teaching With Inter-Nation Simulation and Case Studies." The American Political Science Review, LX, No. 1 (1966), pp. 53-65.

[7]The questions used in the tests are based on Sydney W. Head, Broadcasting in America (2nd ed.; Boston: Houghton Mifflin Company, 1972). See also, Ward L. Quaal and Leo A. Martin, Broadcast Management (New York: Hastings House, Publishers, 1963); Yale Roe, ed., Television Station Management (New York: Hastings House, Publishers, 1964); and Gene F. Seehafer and Jack W. Laemmar, Successful Television and Radio Advertising (New York: McGraw-Hill Book Company, Inc., 1959).

[8]Allen L. Edwards, Experimental Design in Psychological Research (4th ed.; New York: Holt, Rinehart and Winston, Inc., 1972), pp. 112-125. See also Donald J. Veldman, Fortran Programming for the Behavioral Sciences (New York: Holt, Rinehart and Winston, Inc., 1967), pp. 246-257.

[9]Edwards, Experimental Design, pp. 130-153.